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THE LIQUEFACTION OF SARATOV GAS

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The rapid development of the Moscow gas supply, and the increasing significance which gas is acquiring as a fuel in the capital necessitate special attention to guarantee uniform and uninterrupted supply to the gas consumer. Between 54,000 and 55,000 cubic meters of gas come into the capital every hour by the Saratov-Moscow gas main. A large amount of gas will also enter Moscow by the Tula-Moscow gas main, the construction of which is designated in the Five-Year Plan, and by the Rastorguyevo-Moscow gas main from the coal-gas plant, which is under construction in Rastorguyevo Rayon.

Consumption of gas fluctuates greatly at different times of the year and at various hours of the day. The so-called seasonal peaks come in the winter months when the consumption of gas for illumination and heating of homes noticeably increases. The peaks come in the daylight hours when the consumption of gas by industrial enterprises increases. Consumption always declines at night.

The possibility of storing gas for later use during a peak period is one of the advantages of gas installations over electric-power stations.

There are several methods of accumulating gas in large quantities for securing uniform delivery to the consumer. The use of the gas mains themselves for storing a large quantity of gas at high pressure has been shown impractical in the case of the Saratov-Moscow main, where an interruption in the flow of the gas from the Saratov deposits results in rapid exhaustion of the reserve in the main, and the restoration of operating pressure in the main requires considerable time.

The usual method of storage in tanks is too expensive and uses too much metal. The storage of gas in worked-out oil wells, as practiced in the United States, should be carefully considered by scientific research organizations in the case of our cities which are located in gas or petroleum districts.

Another method of accumulating gas involves the obtaining of liquid carbureted hydrogen gases as by-products of petroleum-processing plants. These gases remain in a liquid state under comparatively low pressures and ordinary temperatures; methods of transporting and storing them have been worked out. They appear most frequently in homes in replaceable cylinders or permanent tanks periodically filled with gas delivered by truck.

In recent years the gas industry has begun the liquefaction of natural gas by means of compression in combination with a series of deep refrigerations (down to -160 degrees centigrade). The volume of methane shrinks about 600 times when it is liquified, thus reducing volume of storage space, capital outlay, metal consumption and tank space. The cost of building a plant and storage space for liquid natural gas is several times less than the cost of a group of tanks for an equal quantity of gas.

The presence of a supply of liquefied gas, accumulated during the period of low consumption, makes possible fulfillment of demand at peak periods, and guarantees the consumers a supply when the mains are shut off for repairs.

Liquid methane has a temperature of -160 degrees centigrade. Reservoirs for its storage are manufactured from high-grade types of alloyed steel. Special attention must be paid to securing thermic insulation to safeguard the liquid gas against evaporation.

A plant for the liquefaction of Saratov gas, with underground tanks for storing liquid methane having a volume equivalent to 5 million cubic meters of gas at normal temperature and pressure, will be built in the Moscow area, in the vicinity of the gas-distributing point, by Government decision. In the summer the gas will be accumulated in underground reservoirs. In the winter during the period of maximum consumption, the liquid methane, after re-gasification, will be transmitted through gas-distributing stations at Karacharov and Ochakov into the Moscow system of gas mains via the two existing semicircular pipe systems.

Stored in underground reservoirs, the liquid gas will be an emergency supply in the event of interruption of service in the Saratov-Moscow gas main. This supply would be sufficient for the demands of the home consumer and part of the industrial enterprises for a period of 6 - 8 days.

A central liquid-gas filling station will be constructed in the Moscow area at the same time as the liquefaction plant is built. Liquid gas transported from petroleum refineries in railroad tank cars will be stored here. The central filling station is calculated to store 750 tons of liquid gas. This is equivalent in calorific value to one million cubic meters of Saratov gas. From the central filling station the liquid gas will be conveyed by tank truck to district stations for filling cylinders. The central filling station will constitute another emergency supply in the event of interruption of service on the Saratov-Moscow main.

[The article includes a layout diagram and description of operation of a natural gas liquefaction plant in Cleveland, Ohio.]

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